APPENDIX 1. PROCEDURES FOR OBTAINING FAA APPROVAL FOR IFR/VFR OPERATIONS BY SUPPLEMENTAL TYPE CERTIFICATE OR FAA FORM 337 (FIELD APPROVAL) FOR FOLLOW-ON INSTALLATIONS.

1. APPROVAL OF TECHNICAL DATA BY SUPPLEMENTAL TYPE CERTIFICATE (STC).

a. The STC Applicant:

(1) Makes an application for an STC at the nearest FAA aircraft certification office. Early contact is wise, since scheduling may be critical. FAA evaluates the data submitted by the applicant, issues a Type Inspection Authorization (TIA), and participates in ground/flight tests outlined in paragraph 9. An STC is issued when all airworthiness requirements are met. If the submitted data is adequate, the STC authorizes identical installations in the same aircraft type with the same autopilot/flight director interface.

(2) Designs and installs the VNAV system to the criteria set forth in applicable paragraphs of this advisory circular, or consistent with other data acceptable to the Administrator.

(3) Obtains an authorization from the equipment manufacturer to reference the original data for equipment accuracy (per paragraph 8), or conducts the necessary tests.

(4) Makes an aircraft available (with the VNAV system installed) for ground inspection and flight test. The applicant is responsible for furnishing a qualified flightcrew for the required flight tests.

(5) Should Submit the following kinds of data for FAA airworthiness evaluation:

(i) Equipment data such as:

A Equipment schematics and system wiring diagrams.

B Equipment manufacturer's operating instructions and installation instructions.

C Equipment manufacturer's quality control procedures (not required if manufacturer's quality control is FAA approved).

D Environmental test data.

NOTE: Equipment data need not be submitted if the equipment has been manufactured under a TSO authorization.

(ii) Fault analysis covering installation.

(iii) Installation information and/or photographs.

(iv) Structural substantiation as necessary.

(v) Installation wiring diagrams.

(vi) Flight manual revision or supplement, or placard drawings as required (see paragraph 2c of this appendix).

(vii) Evidence of previously approved data.

(viii) Electrical load analysis.

c. The Equipment Manufacturer Can Certify (to the applicant and FAA) that the performance criteria in paragraph 8 by reference to the original STC are satisfied, a TSO has been obtained, and that the appropriate environmental tests have been conducted.

2. APPROVAL OF TECHNICAL DATA/INSTALLATION FOR IFR OPERATIONS BY FAA FORM 337 (FIELD APPROVAL).

a. Data Submitted by the Applicant. Alteration data for the equipment in installation will be submitted with a properly executed FAA Form 337 and a certification from the manufacturer to confirm that the system accuracy requirements of paragraph 8 have been met.

b. Additional Data Which May Be Required. If required for FAA airworthiness evaluation by the FAA district office approving the technical data/installation, the applicant may also be required to furnish a copy of the equipment data (for equipment not produced under a TSO authorization), manufacturer's operating and installation instructions, fault analysis for installation, installation details and/or photographs, substantiation of structural changes, and system wiring diagrams.

c. Airplane Flight Manual (AFM) or Rotorcraft Flight Manual (RFM) Supplement. An AFM/RFM supplement (or supplemental flight manual) prepared by the applicant and containing the following information must be presented for FAA approval.

(1) Equipment operating limitations.

(2) Emergency/abnormal operating procedures (if applicable).

(3) Normal procedures for operating the VNAV system and any interfaced equipment.

(4) Procedures for verifying proper operation after power outages.

d. The Applicant Makes an Aircraft Available (with the VNAV system installed for ground and flight tests, and is responsible for furnishing a qualified flightcrew for the required flight test. The results of the flight test should be made a part of the data submited. The FAA approving inspector will request to observe the flight test.

NOTE: The FAA inspector will evaluate and sign the airplane flight manual supplement or rotorcraft flight manual supplement (or supplemental flight manual) presented by the applicant as part of a field approval. Generally, FAA inspectors should have sufficient understanding of the AFM or the RFM to approve

a supplement for the VNAV system installation without the need for engineering assistance. However, if engineering assistance is needed then the inspector should request it early in the program.

e. Field approvals of VNAV system installations should be limited to follow-on installations where the original approval was through the TC or STC process and where the system installation is either of the stand-alone kind or where it is interfaced with the same autopilot, flight director, and aircraft instruments. Field approvals without engineering assistance should not be made when:

(1) The VNAV equipment transfers or accepts data from navigation systems, sensors, or computers other than those for which it has previously been approved.

(2) The VNAV equipment is coupled to an autopilot/flight director and the particular installation (aircraft type and VNAV system) has not previously been approved by the TC or STC process.

(3) The aircraft has numerous sources of lateral navigation information installed and available to the VNAV system through a complex switching system.

(4) The VNAV equipment incorporates a software configuration that has not been FAA approved.

3. APPROVAL OF INSTALLATION FOR VFR OPERATIONS. Approval of VNAV system installations for operations under VFR may be obtained by TC, STC, or data field approved by the FAA on an FAA Form 337. If previously approved data is available or the installation can be accomplished by utilizing provisions provided by the airframe manufacturer for standard avionics equipment installations, the installation can then be approved for return to service signed by one of the entities noted in FAR 43; i.e., repair station, manufacturer, holder of an inspection authorization, etc., provided the installation:

a. Conforms to the acceptable methods, techniques, and practices contained in AC 43.13-1A, Acceptable Methods, Techniques and Practices--Aircraft Inspection and Repair, and AC 43.13-2A, Acceptable Methods, Techniques, and Practices--Aircraft Alterations.

b. Does not interfere with the normal operation of other equipment installed in the aircraft. This is accomplished by a ground test and flight test to check that the VNAV equipment is not a source of objectional electromagnetic interference (EMI), is functioning properly and safely, and operates in accordance with the manufacturer's specifications.

c. Does not involve complex switching for integration with other aircraft systems; e.g., electronic flight instrument system (EFIS) displays, various lateral navigation systems, etc. The VNAV system should not be coupled to the vertical navigation function of an autopilot or flight director unless the specific VNAV system, autopilot, and aircraft type have previously been approved under the TC or STC process.

d. Provides a navigation source annunciator if the VNAV installation supplies any information to displays such as an HSI or CDI which can also display data from other equipment normally used for aircraft navigation.

e. Except for items c and d of this paragraph, is completely isolated from all IFR systems.

f. Has an approval recordation contained in an FAA Form 337 and that a placard is in clear view of the pilot which indicates "VNAV System Not Approved For IFR."

APPENDIX 2. SAMPLE AIRPLANE FLIGHT MANUAL SUPPLEMENT.

INSTALLATION CENTER/FAA REPAIR STATION #_____
123 Fourth Street Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

AIRPLANE MAKE:

AIRPLANE MODEL:

AIRPLANE SERIAL NUMBER:

AIRPLANE REGISTRATION NUMBER:

This document must be carried in the airplane at all times. It describes the operating procedures for the _____ VNAV System when it has been installed in accordance with (manufacturer's installation manual) and FAA Form 337 dated _____.

For airplanes with a Pilot's Operating Handbook and/or FAA approved Airplane Flight Manual, this document serves as the FAA approved _____ VNAV System Flight Manual Supplement. When the _____ VNAV System is installed in an airplane that does not have an FAA approved Airplane Flight Manual, this document serves as the FAA approved Supplemental Flight Manual.

The information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual (if applicable).

FAA APPROVED: _____
(Inspector's Name)
Aviation Safety Inspector (Avionics)
ACE-GADO/ACDO/FSDO #_____
Federal Aviation Administration

FAA APPROVED
DATE: _____

INSTALLATION CENTER/FAA REPAIR STATION #_____
123 Fourth Street
Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

SECTION 1

INTRODUCTION

A. EQUIPMENT DESCRIPTION

Provide a general description of the VNAV equipment installed in the aircraft.

B. GENERAL

Provided the _____ VNAV system is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy requirements of:

VFR/IFR en route, terminal, and approach (if applicable) VNAV operation within the conterminous United States and Alaska in accordance with the criteria of AC 20-129.

FAA APPROVED
DATE: _____

INSTALLATION CENTER/FAA REPAIR STATION #_____
123 Fourth Street
Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

SECTION II

LIMITATIONS

A. The _____ VNAV System Pilot's Guide, P/N _____, dated _____, (or later revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the system.

B. When using the _____ VNAV system, the altimeter must be used as the primary altitude reference for all operations.

C. Minimum altitude for autopilot coupled VNAV operation is _____ feet (AGL).

FAA APPROVED
DATE: _____

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Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

SECTION III

EMERGENCY PROCEDURES

A. If VNAV information is intermittent or lost, disengage VNAV and utilize the altimeter for vertical guidance.

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Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

SECTION IV

NORMAL PROCEDURES

A. OPERATION

Normal operating procedures are outlined in the Pilot's Guide, P/N _____ dated _____, (or later revision).

B. SYSTEM ANNUNCIATORS

Describe each remote annunciator, such as:

1. Waypoint (WPT)

2. Message (MSG)

C. SYSTEM SWITCHES

Describe the function and operation of the various switches used with the system.

D. PILOT'S DISPLAY

Describe the pilot's display (i.e., CDI, HSI, RMI, OBS).

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DATE: _____

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VNAV SYSTEM

E. COPILOT'S DISPLAY

Describe the copilot's display (i.e., CDI, HSI, RMI, OBS).

F. AUTOPILOT OPERATION

Describe the coupling of VNAV System steering information to the autopilot.

G. FLIGHT DIRECTOR

Describe the coupling of VNAV System steering information to the flight director.

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DATE: _____

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Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
VNAV SYSTEM

SECTION V

ABNORMAL PROCEDURES

No change.

SECTION VI

PERFORMANCE

No Change

FAA APPROVED
DATE: _____

APPENDIX 3. SAMPLE DATA SHEET TO ATTACH TO FAA FORM 337.

ATTACH TO FAA FORM 337
AIRPLANE MAKE:

AIRPLANE MODEL:

AIRPLANE SERIAL NUMBER:

AIRPLANE REGISTRATION NUMBER:

DATE WORK COMPLETED:

_____ Vertical Navigation System, consisting of the following components, was installed per _____ Installation Manual Number _____, Revision _____, dated _____. The installation conforms to AC 43.13-1A and AC 43.13-2A.

Equipment	Part Number	Serial Number	Software Version
____ VNAV Computer	xxx-xx-xxxx	yyyy-zz	ww
____ Control/Display	xxx-xx-xxxx	yyyy-zz	ww
____ etc.			

Proper ground operation of the _____ system was confirmed through completion of the system checkout, Section ____, of the Installation Manual. The system was found to meet or exceed all specifications of this section.

A flight check was made to insure that the accuracy requirements of AC 20-129 were met during flight.( ) YES ( ) NOT APPLICABLE